

ON THE MOLLUSCA OF SOME HOLOCENE DEPOSITS OF THE
THAMES RIVER SYSTEM.

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I. UXBRIDGE, MIDDLESEX.

The Holocene deposits of the River Colne, though extensive, are practically unknown, and the only description of them was that given by J. Allen Howe in 1903.¹ The valley of the Colne undoubtedly resembles those of the Lea and the main stream of the Thames itself in that it furnishes evidence of the presence of an old and now buried channel. Unfortunately we have no details as to the depth or exact situation of this channel, but, judging from the main stream, the depth would probably be about 35 feet at Uxbridge. The sections examined are, as so often the case, very different in character. The first one is close to the present bed of the river, where extensive excavations have been made for gravel. The section is—

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|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------|
| 1. Peaty earth | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2-6 feet. |
| 2. Gravel | ... | ... | ... | ... | ... | ... | ... | ... | ... | 10-20 ,, |

The peaty earth contains in places a little shell-marl, and the upper part yielded sixteenth century pottery, bones of ox, horse, sheep, pig, dog, and part of a single shed antler of fallow-deer.

According to information supplied by the workmen, this bed is thickest near the river and gradually thins out towards the eastern side of the valley. The gravel is of Pleistocene age, and probably belongs to the fourth terrace, i.e. a stage later than Crayford. The water-level is about a foot below the top of the gravel, and the gravel is excavated mechanically under water until the London Clay is reached. On the top of the gravel and beneath the alluvium an enormous number of worked flints, probably of late Pleistocene age, was found.

The other sections were first noted by our friend Mr. A. Loydell, who most kindly informed us of them, and placed the extensive collection of Mollusca which he had made at our disposal. These sections are situate at the foot of the eastern side of the valley just north of the main road, and were made during the construction of a railway siding. The deposit here is a sandy clay with molluscan remains scattered throughout, and but little peaty matter or gravel is seen. These beds yielded no evidence in the shape of human relics as to their age.

From these deposits we are now able to record fifty-nine species of Mollusca, viz.—

¹ Proc. Geol. Assoc., vol. xviii (1903), pp. 188-190.

- Vitrina pellucida* (Müll.), 1 example.
Vitreola crystallina (Müll.), 2 examples.
V. cellaria (Müll.), 7 examples.
V. radiatula (Ald.), common.
Zonitoides nitidus (Müll.), common.
Eucomulus fulvus (Müll.), common.
Arion ater (Linn.), 5 granules.
Punctum pygmaeum (Drap.), 20 examples.
Pyramidula rotundata (Müll.), 7 examples.
Sphyradium edentulum (Drap.), 1 example.
Acanthinula aculeata (Müll.), 1 example.
Helicella Itala (Linn.), 3 examples.
Hygromia hispida (Linn.), common.
H. sericea (Drap.), common.
H. rufescens (Penn.), 1 example.
Vallonia pulchella (Müll.), common.
Helix aspersa, Müll., 2 examples.
H. nemoralis, Linn., common.
Helicigona arbustorum (Linn.), common.
Cochlicopa lubrica (Müll.), common.
Janina muscorum (Linn.), common.
Vertigo antivertigo (Drap.), 10 examples.
V. pygmaea (Drap.), common.
Clausilia laminata (Mont.), 3 examples.
C. bidentata (Ström.), 2 examples.
Succinea putris (Linn.), 10 examples.
S. elegans, Risso, common.
Carychium minimum, Müll., common.
Ancylus fluviatilis, Müll., 4 examples.
Aeroloxus lacustris (Linn.), 3 examples.
- Limnaea auricularia* (Linn.), 3 examples.
L. pereger (Müll.), common.
L. palustris (Müll.), common.
L. truncatula (Müll.), common.
L. stagnalis (Linn.), common.
Planorbis corneus (Linn.), 7 examples.
P. albus, Müll., common.
P. Strömii, West., 1 example.
P. crista (Linn.), 1 example.
P. carinatus, Müll., 8 examples.
P. umbilicatus, Müll., common.
P. vortex (Linn.), 2 examples.
P. leucostoma, Millet, common.
P. contortus (Linn.), common.
Lymnaea fontinalis (Linn.), 3 examples.
Aplecta hypnorum (Linn.), 1 example.
Paludestrina ventrosa (Mont.), 1 example.
Bithynia tentaculata (Linn.), common.
B. Leacii (Shepp.), 6 examples.
Valvata piscinalis (Müll.), common.
V. cristata, Müll., common.
Neritina fluviatilis (Linn.), 5 examples.
Sphaerium corneum (Linn.), 4 valves.
Pisidium amnicum (Müll.), 10 valves.
P. Henslowianum (Shepp.), 14 valves.
P. pulchellum, Jenyns, 1 pair and 1 valve.
P. Casertanum (Poli) [= *cinereum*, Alder], 6 valves.
P. Gassiesianum, Dupuy, 12 valves.
P. pusillum (Gmel.), common.

One young valve of *Pisidium Henslowianum* possesses the appendicula, the remainder, although some of the examples are fine specimens, being devoid of it.

Vitrina pellucida, though a very common and widely distributed shell in these Islands, is extremely rare in a fossil state, and here it is only represented by a single young example.

Hygromia hispida is the commonest helicoid, and as usual is extremely variable, but the larger number are typical *hispida* (= *concinna*, Jeff.). We have on previous occasions mentioned the probability of the existence in England of another species of *Hygromia*, and we are now able to definitely introduce the name of *Hygromia sericea*, Drap. This is the *H. sericea*, Drap., of Continental authors, not of Jeffreys, which latter form is the *H. granulata*, Alder.¹

¹ Draparnaud was under the impression, as his synonymy shows, that his shell was identical with the *H. sericea* of Müller, but, as first pointed out by Beck in 1837 ("Index Moll.," p. 20), and frequently since by other authors, Müller's shell was a young and hispid form of his *H. incarnata*. This has been further established by co-types kindly sent us by Dr. A. C. Johansen. Strictly, then, Draparnaud's name cannot stand, but no other name seems available. Studer's *H. albulata* is too imperfectly defined, while the *H. piligera*, Ziegler, is a *nomen nudum*, and *H. globularis*, Jeff., is a synonym for *H. granulata*. Under the circumstances we prefer to employ the name in use on the Continent, and to leave it for some future monographer to deal with the question.

We are greatly indebted to Dr. O. Boettger and Dr. Ewald Wüst for kind assistance in determining this species. In a living state we are able to record it from Harrogate, Yorkshire; Knettishall, Mendlesham, Suffolk; whilst in a fossil state it is represented in our collections from the Holocene of Knettishall, Suffolk; Clifton Hampden, Oxfordshire; Staines, Middlesex; Walthamstow, Chignal, Ilford, Essex; Greenhithe, Kent; Westbury, Gloucestershire; and from the Pleistocene of Barnwell, Cambridgeshire; Copford, Essex; and Swansecomb, Kent. There can be no doubt that it is a widely distributed form in England, especially in the eastern counties, but we have not as yet seen specimens from Wales, Ireland, or Scotland.

The band formulæ of the specimens of *Helix nemoralis* are—

1 2 3 (4 5)	...	...	...	...	8 examples.
(1 2) 3 (4 5)	...	...	...	...	5 "
1 2 3 4 5	...	...	...	...	8 "
1 0 3 (4 5)	...	...	...	...	2 "
0 0 3 0 0	...	...	...	...	2 "
1 0 3 4 5	...	...	...	...	2 "
0 (2 3 4 5)	...	...	...	...	1 "
(1 2 3 4 5)	...	...	...	...	1 "

In their general facies the examples of this species from Uxbridge are very similar to those from the Lea alluvium at Walthamstow.

Helicigona arbustorum, as usual, varies very much in size, the largest measuring 20×22.5 mm., and the smallest 13×17 mm. A mature sinistral example of this species, found and kindly given us by Mr. Loydell, measures 15×17 mm., and is the only fossil reversed specimen that we can trace, though one or two living examples have been found in this country.

Planorbis Stræmii is only represented by a single example, and that may well be a derived specimen.

We have ventured to apply the name of *Planorbis leucostoma*, Millet,¹ to the shell which is generally called in these Islands *P. spirorbis*, Linn., because it is not the latter form, though possibly only an extreme variety thereof.

Paludestrina ventrosa is represented by a single example, and is an extremely interesting record. At the present time this species is with us a brackish-water form, and in the Thames it is not found far above Erith, but in Pleistocene times it was present in fresh water, whilst on the Continent at the present day it frequents both brackish and fresh waters.

Speaking broadly, the shells from Uxbridge are a typical Thames Holocene group, and are in all probability of Roman or post-Roman age.

¹ The name *P. rotundatus*, Poirét, 1801, antedates this, and is by some authorities considered to represent a synonym of Millet's species, but there is considerable doubt as to what Poirét's species really was, and hence we have not adopted the name.

II. WALLINGFORD, BERKS.

We are indebted to Mr. H. J. Osborne White for the material and the details of this section. It is exposed in a boat slip about 100 yards north of Wallingford Bridge on the Oxfordshire side, but is within the Berkshire boundary, which here crosses the river. The section shows—(a) Shelly loam, about 4 feet thick at the highest part of the bank, near the stream, resting on (b) fine sandy gravel with shells just showing above the water-level.

This bed also yielded remains of ox, horse, and probably sheep. Molluscan remains are abundant in the bed *a*, and of these we are able to compile a list of twenty-six species, viz.—

<i>Agriolimax agrestis</i> (Linn.), 2 examples.	<i>P. vortex</i> (Linn.), 1 example.
<i>Vitrea crystallina</i> (Müll.), 1 example.	<i>Bithynia tentaculata</i> (Linn.), common.
<i>V. nitidula</i> (Drap.), 1 example.	<i>B. Leachii</i> (Shepp.), 4 examples.
<i>Arion ater</i> (Linn.), common.	<i>Valvata piscinalis</i> (Müll.), common.
<i>Hygromia hispida</i> (Linn.), 6 examples.	<i>V. cristata</i> , Müll., 2 examples.
<i>Vallonia pulchella</i> (Müll.), 3 examples.	<i>Neritina fluviatilis</i> (Linn.), common.
<i>Helicigona arbustorum</i> (Linn.), 1 example.	<i>Unio tumidus</i> , Retz., 1 valve.
<i>Cæcilioides acicula</i> (Müll.), 1 example.	<i>Sphærium corneum</i> (Linn.), 10 valves.
<i>Ancylus fluviatilis</i> , Müll., 1 example.	<i>Pisidium amnicum</i> (Linn.), 4 valves.
<i>Limnæa auricularia</i> (Linn.), 1 example.	<i>P. supinum</i> , A. Schm., 16 valves.
<i>L. pereger</i> (Müll.), 1 example.	<i>P. Henslowianum</i> (Shepp.), 3 valves.
<i>Planorbis albus</i> , Müll., 3 examples.	<i>P. Casertanum</i> (Poli) [= <i>cinereum</i> , Alder]?
<i>P. Stræmii</i> , West., 8 examples.	3 valves.
<i>P. crista</i> (Linn.), 2 examples.	

Bed *a*, judging from its constituent material and the contained mollusca, has been gradually accumulated during repeated floods, and is in all probability being continually added to. The mollusca form a typical Thames Holocene group, all the characteristic species being present. We would again draw attention to the presence of *Planorbis Stræmii* as showing the formerly widespread distribution in the Thames basin of this form, now quite extinct in England.

Of bed *b*, owing to its position, we have not been able to procure so much material as from bed *a*, hence our list of the included mollusca is smaller, comprising only sixteen species, viz.—

<i>Hygromia hispida</i> (Linn.), 1 example.	<i>Valvata piscinalis</i> (Müll.), common.
<i>Succinea elegans</i> , Risso, 1 example.	<i>Neritina fluviatilis</i> (Linn.), common.
<i>Acroloxus lacustris</i> (Müll.), 1 example.	<i>Anodonta cygnæa</i> (Linn.), 2 fragments.
<i>Limnæa pereger</i> (Müll.), 2 examples.	<i>Sphærium corneum</i> (Linn.), 1 valve.
<i>Planorbis Stræmii</i> , West., 1 example.	<i>Pisidium amnicum</i> (Linn.), 1 valve.
<i>P. carinatus</i> , Müll., 1 example.	<i>P. Henslowianum</i> (Shepp.), 1 valve.
<i>Bithynia tentaculata</i> (Linn.), common.	<i>P. Casertanum</i> (Poli) [= <i>cinereum</i> , Alder],
<i>B. Leachii</i> (Shepp.), 4 examples.	1 valve.
<i>Vivipara vivipara</i> (Linn.), 4 examples.	

This bed is undoubtedly a true stream deposit, and has been laid down in the channel of the river. None of the species calls for any extended notice.

III. CAVERSHAM, OXFORDSHIRE.

We are indebted to Mr. L. Treacher for our knowledge of this deposit, which is situated about 200 yards below Caversham Lock on the Berkshire bank of the Thames. The section shows—

1. Alluvium, with very few shells 3 feet.
2. Shelly loam 1 foot.
3. Gravel, passing under the river.

Mr. Treacher kindly sent us a sample of the shelly loam, and on washing this we obtained a large number of molluscan remains, representing twelve species, viz.—

<i>Arion ater</i> (Linn.), abundant.	<i>Cochlicopa lubrica</i> (Müll.), 1 example.
<i>Vallonia pulchella</i> (Müll.), common.	<i>Jamnia muscorum</i> (Linn.), 9 examples.
<i>Zonitoides nitidus</i> (Müll.), 1 example.	<i>Succinea elegans</i> (Risso), 3 examples.
<i>Hygromia hispida</i> (Linn.), abundant.	<i>Limnæa pereger</i> (Müll.), 3 examples.
<i>Helicella Itala</i> (Linn.), 4 examples.	<i>L. palustris</i> (Müll.), 6 examples.
<i>Helix nemoralis</i> , Linn., 2 examples.	<i>L. truncatula</i> (Müll.), 5 examples.

We also obtained two small flint flakes. It will be noted at once that no less than eight species are land mollusca, three are aquatic, and one semi-aquatic, whilst numerically the land mollusca predominate. There can be little doubt that we are here dealing with an old land surface, and one that, judging from the abundance of slug granules, was subject to flooding. A change in the level of the river has accelerated the deposition of alluvium, and it now lies buried under 3 feet of that material. In all probability it is of some antiquity, and from the occurrence of the flint flakes may well be of Neolithic age. The band formulæ of the two individuals of *Helix nemoralis* are—1 2 3 4 5 and (1 2 3 4 5). The occurrence of *Helicella Itala* is noteworthy, since it is a species that rarely occurs in a Holocene alluvial bed.

IV. ILFORD, ESSEX.

In 1904 Dr. Frank Corner sent us a quantity of material which had been obtained from a depth of 6 feet during the rebuilding of the bridge over the Roding. From this, by careful washing, a large number of mollusca was obtained. The deposit is undoubtedly newer than the upper peat, and therefore post-Roman, but nothing was obtained that can in any way enable us to accurately fix its age, although it may well be pre-Norman. Twenty-three species were determined, viz.—

<i>Arion ater</i> (Linn.), 1 granule.	<i>Vivipara vivipara</i> (Linn.), 2 examples.
<i>Hygromia hispida</i> (Linn.), 1 example.	<i>Valvata piscinalis</i> (Müll.), common.
<i>Succinea elegans</i> , Risso, 3 examples.	<i>Assemanina Grayana</i> , Leach, 1 example.
<i>Ancylus fluviatilis</i> , Müll., 1 example.	<i>Neritina fluviatilis</i> (Linn.), 5 examples.
<i>Aceroloxus lacustris</i> (Müll.), 2 examples.	<i>Anodonta cygnea</i> (Linn.), 1 example.
<i>Limnæa pereger</i> (Müll.), 6 examples.	<i>Sphærium corneum</i> (Linn.), common.
<i>L. palustris</i> (Müll.), 4 examples.	<i>Pisidium annicum</i> (Linn.), 1 example.
<i>L. truncatula</i> (Müll.), 1 example.	<i>P. Henslowianum</i> (Shepp.), 2 valves.
<i>Planorbis carinatus</i> , Müll., 2 examples.	<i>P. subtruncatum</i> , Malm, 4 valves.
<i>P. vortex</i> (Linn.), 1 example.	<i>P. pulchellum</i> , Jenyns, 1 valve.
<i>Bithynia tentaculata</i> (Linn.), common.	<i>P. Casertanum</i> (Poli) [= <i>cinereum</i> , Alder]? 7 valves.
<i>B. Leachii</i> (Shepp.), 6 examples.	

Of these the most important is *Assemanina Grayana*, which has not hitherto been detected fossil. It is an extremely interesting species, being only known in a living state in England from the estuarine portion of the Thames and Medway, from the River Colne, the Blackwater, the Kentish Stour, the Orwell, the Alde and the Blyth

in Suffolk. On the Continent it is known from Ribe, in Denmark, has been recorded from rejectamenta of the sea on the Belgian coast near the French frontier,¹ and has been taken on the German coast² on the banks of the dykes of the Dollart in the estuary of the Ems, and at Dangast on the Jade Busen. It will be noted that it only occurs in the area of the old Thames-Rhine river system, and its present discontinuous distribution is to be explained by the inroads of the North Sea, submerging the old estuary.

V. DAGENHAM, ESSEX.

In August, 1905, Dr. Frank Corner sent us a large quantity of material which had been obtained at a depth of 20 feet at Dagenham. The soil is a peaty silt containing many twigs and yielding a fair number of molluscan shells, as well as a few caddis-worm cases and insect remains. It is obviously a river deposit, whilst the depth at which it occurs shows that we are dealing with the older Holocene beds, deposits which are but rarely exposed in the Thames Valley, and in fact molluscan remains have only been noted from four localities—Crossness, Charlton, Tilbury, and the London Docks. We are able to record thirty-two species, viz.—

<i>Zonitoides nitidus</i> (Müll.), 5 examples.	<i>P. leucostoma</i> , Millet, 5 examples.
<i>Pyramidula rotundata</i> (Müll.), common.	<i>P. vortex</i> (Linn.), 6 examples.
<i>Helix nemoralis</i> , Linn., 1 example.	<i>P. crista</i> (Linn.), 2 examples.
<i>Helicigona arbustorum</i> (Linn.), 2 examples.	<i>P. fontanus</i> (Lightf.), 3 examples.
<i>Ancylus fluviatilis</i> , Müll., 2 examples.	<i>Bithynia tentaculata</i> (Linn.), common.
<i>Acroloxus lacustris</i> (Müll.), common.	<i>B. Leachii</i> (Shepp.), common.
<i>Succinea elegans</i> , Risso, common.	<i>Valvata piscinalis</i> (Müll.), common.
<i>Limnæa peregr</i> (Müll.), common.	<i>V. cristata</i> , Müll., 8 examples.
<i>L. palustris</i> (Müll.), common.	<i>Neritina fluviatilis</i> (Linn.), 2 examples.
<i>L. stagnalis</i> (Linn.), 1 example.	<i>Unio tumidus</i> , Retz., 8 valves.
<i>L. truncatula</i> (Müll.), 4 examples.	<i>Sphaerium corneum</i> (Linn.), 4 valves.
<i>Planorbis corneus</i> (Linn.), common.	<i>Pisidium amnicum</i> (Linn.), 12 valves.
<i>P. umbilicatus</i> , Müll., common.	<i>P. Henslovianum</i> (Shepp.), common.
<i>P. carinatus</i> , Müll., 6 examples.	<i>P. Casertanum</i> (Poli) [= <i>cinereum</i> , Alder], common.
<i>P. contortus</i> (Linn.), 10 examples.	<i>P. Gassiesianum</i> , Dupuy, 2 valves.
<i>P. albus</i> , Müll., 12 examples.	<i>P. pusillum</i> (Gmel.), common.

All the examples of *Pisidium Casertanum* belong to the thick hinged mutation.

This collection forms an important addition to our knowledge of the mollusca of the early Holocene, for there are several species which were not noticed at either Crossness or Tilbury. These are *Planorbis corneus*, *P. albus*, *P. carinatus*, *P. vortex*, and *Pisidium amnicum*. Of particular interest are the examples of *Bithynia Leachii*, which resemble the recent Thames form and differ markedly from the var. *inflata*, which was the prevalent type during the deposition of the Pleistocene brick-carths of Crayford and Ilford.

It is noteworthy that *Planorbis Strömii* is absent as at Crossness and Tilbury. In the main stream it has not yet been found lower

¹ Malzine (F. de), Mém. Soc. Sci. Hainault, i (1867), p. 317.

² Borcharding (F.), Abhandl. Naturw. Ver. Bremen, 1883, p. 330.

down than Bermondsey, whilst, in the Lea Valley, Canning Town is its limit.

Practically all the shells show only too plainly the corrosive action of the decaying vegetable remains in which they were buried. This is particularly noticeable in *Unio tumidus* and *Neritina fluviatilis*. The examples of the former were so decayed that it was impossible to preserve them, although the species could be easily determined, whilst the two specimens of the latter are nearly destroyed, only the thicker part of the shell remaining.

The deposit is without doubt a shallow-water one out of the main current, and the presence of silt demonstrates that running-water did occasionally reach the spot. There is a total absence of all brackish-water forms, and this, in conjunction with the depth, clearly shows that the deposit was laid down in early Holocene times, when England stretched far out into what is now the North Sea, and the tidal waters were probably miles away.
